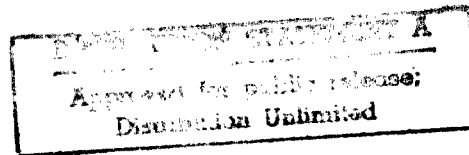


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28 February 1984



# Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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28 February 1984

# WORLDWIDE REPORT

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**HAYDEN: URANIUM MINING LENDS CLOUT IN DISARMAMENT TALKS**

Perth THE WEST AUSTRALIAN in English 19 Jan 84 p 3

[Text]

**AUSTRALIA has a better chance of influencing disarmament debates while it is a major uranium exporter, says the Minister for Foreign Affairs, Mr Hayden.**

He told the University of WA Summer School that exports made Australia an important actor in world co-operation on the peaceful use of nuclear energy, an essential part of the three-sided deal enshrined in the nuclear non-proliferation treaty.

Australia's influence would be diminished without the exports and its permanent seat on the board of governors of the International Atomic Energy Agency would be compromised and probably passed on to a South-East Asian nation.

Mr Hayden said: "Overall, we would be less effective because we would be less relevant."

"This would not only be irresponsible; it would also be morally reprehensible."

Mr Hayden said that there were two areas of policy that involved Australia in the nuclear dilemma more directly than many other countries—the presence on Australian soil of joint Australian-U.S. facilities and "our possession of huge quantities of uranium which could be mined for export for use in the civil nuclear fuel cycle."

## Dumped

The escalation of nuclear arms stock-piling by both superpowers worried him but he did not believe that the world would be more stable if the U.S. unilaterally dropped its nuclear capability.

Till better systems of restraint were available for arms control and disarmament he accepted that the deterrent principle was the only practical option to avoid serious international nuclear instability or open conflict.

It would be immoral for Australia not to contribute what it could in support of arms verification, arms control and deterrence as contributions to the only, be it imperfect, system of nuclear restraint.

Therefore, he defended the Australian-U.S. facilities in Australia.

Mr Hayden said: "Our involvement with the U.S. gives us much greater claim to be heard on these matters internationally."

"There is much greater weight behind our declarations on this subject precisely because we are sensible enough to support the only effective nuclear restraint system at the moment — deterrence. But we are intelligent enough to worry about escalation and excessive armories to want something better and to work for it openly and energetically."

## Advance

Mr Hayden said that the achievement of a South Pacific nuclear-weapons-free zone would be an important advance in restraining nuclear-arms manufacture, testing, storage and dumping.

But he rejected charges of double standards in Australia's attitude to the South Pacific zone.

PEOPLE'S REPUBLIC OF CHINA

NUCLEAR WEAPONS, MISSILE DEVELOPMENT REVIEWED

OW260312 Beijing Domestic Service in Mandarin 2335 GMT 23 Dec 83

[Article by Qian Xuesen: "Head for Achieving the Grand Objective of Modernization of the National Defense"--published in issue No 12 of the 1983 JIEFANGJUN HUABAO (LIBERATION ARMY PICTORIAL)]

[Text] Seven years ago Comrade Mao Zedong left us. During this time, our great motherland, which is growing in prosperity, has been heading toward the goal of becoming a modern socialist power and realizing Comrade Mao Zedong's call that the national defense must be modernized.

In these days when we commemorate the 90th anniversary of Comrade Mao Zedong's birth, numerous things that happened in the past come to my mind. This is especially so whenever I look at the picture of Comrade Mao Zedong's receiving me in December 1965.

As early as the mid-1950's, Comrade Mao Zedong, with great foresight and acting on behalf of our party and the peoples, made the decision that China must rely on its own efforts in developing and producing China's own guided missiles and nuclear weapons. He pointed out in June 1958: I think it is entirely possible that we can develop the atomic bomb and the hydrogen bomb in 10 years.

This showed the party's confidence in and encouragement for those of us working in the scientific and technological field. The party believed that with the energetic support of the whole country scientists and technicians would be able to tackle this problem, which involved advanced modern science and defense technology. To encourage us, Comrade Deng Xiaoping, who was then the secretary general of the CPC Central Committee, said: If successful, the credit will belong to you; if not, I will be held responsible.

Not long afterward, Comrade Zhou Enlai personally presided over the organization of the project. But it was Comrade Nie Rongzhen who later actually led and organized the project. Thanks to their brilliant leadership, China's scientists and technicians did not disappoint the party and the people, who trusted us completely. On 16 October 1964, China's first atomic bomb was successfully tested. On 27 October 1966, we successfully launched and detonated a guided missile with a nuclear warhead; on 17 June 1967, we successfully tested China's first hydrogen bomb. The project was 1 year ahead of Comrade Mao Zedong's timetable. Today, China's scientists and technicians can inform Comrade Mao Zedong, who has left us, that we have also successfully launched a carrier missile into the Pacific Ocean, successfully launched a carrier missile from under the sea, and successfully carried out new underground nuclear tests, and that new advances have been made in our country's defense technology.

Chinese intellectuals are capable of solving other key problems in addition to those in the field of guided missiles and nuclear weapons. Since 1970, Chinese intellectuals have applied the technology acquired in that field to developing man-made satellites, and have successfully launched 13 satellites on 11 occasions. On one occasion, three satellites were launched simultaneously by one rocket. In the future, efforts will be made so that China's space technology can be applied in the economic sector and in social development.

To my mind these past events can indeed enable us to deeply understand that our party's decision to develop China's advanced defense technology was entirely correct. We cannot imagine what our country's situation in the world today would be if we had no guided missiles. The course traversed over the past 20 years has proven that our party was absolutely correct in trusting and relying on our country's scientists and technicians.

CSO: 5100/4108



PEOPLE'S REPUBLIC OF CHINA

BRIEFS

SCIENTISTS ATTEND IAEA SYMPOSIUM--Sofia, 10 Feb (XINHUA)--A science symposium on "Methods for Investigation and Evaluation of Locations for Underground Disposal of Radioactive Waste," sponsored by the International Atomic Energy Agency (IAEA) was held from 6 to 10 February in Sofia, the capital of Bulgaria. Chinese representatives attended this symposium and were warmly welcomed by other participants. A total of 110 representatives from 27 countries, including China, the United States, Britain, France, Canada, and Bulgaria, and from 3 international organizations attended this science symposium, at which 36 papers were read. [Text] [OW121259 Beijing XINHUA Domestic Service in Chinese 0909 GMT 11 Feb 84]

CSO: 5100/4110

## THAILAND

### BRIEFS

NUCLEAR FEASIBILITY STUDY--A team of experts from the International Atomic Energy Agency or the IAEA is expected to conduct a feasibility study on the building of nuclear power plants in Thailand early next year. Secretary General of the Office of Atomic Energy for Peace Athon Pathumasat says that the experts will survey the future energy needs of Thailand and the sources of raw materials. Mr Athon says his office has already chosen seven potential sites for nuclear power plants with assistance from the Italian Government. The sites include areas mostly in the Southern provinces such as Chumphon, Makhon Si Thammarat, and Surat Thani. Mr Athon adds that the Office of Atomic Energy for Peace is asking for more assistance from Italy for the second phase of the project, which would cost about 27 to 30 million baht.

[Text] [BK210616 Bangkok Domestic Service in English 0000 GMT 21 Nov 83]

CSO: 5100/4355

NUCLEAR ACCIDENT PROMPTS COMMUNIQUE DEFENDING BENINSON

Buenos Aires LA NACION in Spanish 21 Jan 84 p 10

[Text] With the signature of its president, Mr Cesar F. Arias, and its secretary, Mr Norberto R. Ciallella, the Argentine Radiological Protection Association (which includes professionals and technicians working with radioactive material and scientists concerned over the protection required by those who in any way handle that type of nuclear material) released a press communique in which they respond to charges against Dr Dan Beninson, a founding associate of the entity and (as they state) "the forerunner of radiological protection and nuclear safety," in our country.

The Communique

The text of the communique issued by the Argentine Radiological Protection Association is as follows:

"In view of the affronts against Dr Dan Beninson made during a press conference (held by the Group of 586 Delegates of the Argentine National Commission for Atomic Energy's UPCN [National Civil Service Personnel Union]), the Argentine Radiological Protection Association considers it an ineluctable obligation to make the following statement:

"When groundless claims are made superficially, which hurt the reputation of a citizen, an act of irresponsibility is committed violating one of the most important rights of the human being: the right to protect the reputation that has been deservedly gained.

"At the aforementioned press conference, Dr Beninson was accused of being "the one responsible for all the deaths due to radiation in recent years..." In this regard, it should be noted that:

Exoneration

"a. Over 25,000 individuals in the country are working with ionizing sources (about 5,000 with radioactive material and over 20,000 with X-ray equipment).

"b. During the past 30 years, there has been only one death attributable to over-exposure to radiation.

"c. The investigating committee for the single fatal accident that has been mentioned never concluded that the blame for the death in question was attributable to Dr Beninson.

#### Proper Protection

"d. The fact that there has been only one fatality among all the workers exposed during more than 30 years is an eloquent indication of the correctness with which radiological protection has been undertaken in the country. This policy was developed by CNEA [National Commission for Atomic Energy] in 1954 and, promoted by the latter, was extended to the jurisdiction of the Public Health Ministry in 1966.

"e. Dr Beninson has been the forerunner of radiological protection and nuclear safety in our country, and is a founding member of this association. His scientific knowledge ranks him on the highest level, both in the country and abroad.

#### International Organization

"f. The Argentine Radiological Protection Association is a member of the International Radiological Protection Association, which has over 25 associations distributed throughout the world. In our country, SAR has nearly 200 members, among whom are included our country's most outstanding professionals in the field.

"By virtue of what has been stated, one can only conclude that what was claimed at the aforementioned press conference is a gross attempt to discredit a citizen of irreproachable ethical behavior and the greatest scientific worth, acknowledged in the country and internationally."

2909

CSO: 5100/2600

## ARGENTINA

### CASTRO MADERO EXAMINES PRACTICAL PURPOSES OF NUCLEAR PLAN

Buenos Aires LA NACION in Spanish 14 Jan 84 p 7

[Article by R/Adm Carlos Castro Madero\*]

[Text] With the announcement that Argentina has mastered the technology of uranium enrichment, a variety of opinions about the wisdom of the investments made by Argentina in its nuclear plan have been expressed.

For an objective and complete analysis of the issue, I believe it is appropriate to make the following remarks.

#### Objections to the Nuclear Plan

It is not correct to think that the nuclear plan is an end in itself, that is, that the basis for its planning and execution is a matter of prestige. That is far from the truth. The nuclear plan is designed to give Argentina an energy source that is essential for our growth by means of our own technological advancement. Nor is it correct to say that electricity produced by nuclear power is the most expensive form. On the contrary, compared with electricity produced from oil, gas, or coal, it is the cheapest form of electricity, as well as the most reliable, the safest, and cleanest.

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\* The author holds the rank of vice admiral (ret) in the Argentine Navy and has a doctorate in physics. From 1972 to 1976 he served as head of the National Research and Development Service. From 1976 to 1983 he was chairman of the National Atomic Energy Commission. During that same period he was a member of the board of governors of the IAEA [International Atomic Energy Agency]. He chaired that board in 1976 and from 1979 to 1982 was a member of the scientific committee of the AIEA.

We should mention that it is not possible to compare it with energy produced by hydroelectric power, since the cost of that form of electricity differs in each particular case.

The advantages sought have led to a growing number of nuclear power plants being built all over the world. At the present time there are 297 nuclear power plants in operation and 216 plants under construction in 25 countries. This is a result of the necessity of having the greatest possible amount of electricity available at the lowest cost, and of reducing to the utmost the consumption of fossil fuels.

Therefore, it is incorrect to speak of the nuclear plan as a project similar to the pharaohs' plans for building the pyramids, if by such projects people mean colossal undertakings with no economic rationale.

On the contrary, the construction program for the nuclear plan will enable us to generate the electricity we need to mobilize our national economy and to provide the conditions that are essential for the population's wellbeing. At the same time, these projects will be generating the economic resources needed to provide for their own financing and expansion.

Atucha I has provided the national electricity system with an average of 2,500,000 Mwh a year, and Embalse is beginning to supply electricity, at a rate of about 4,800,000 Mwh per year. This energy produced by nuclear power plants will contribute approximately \$250 million a year to our national economy.

I also consider it unfair to say that information about the CNEA's [National Atomic Energy Commission] spending has been concealed. All of the spending for our nuclear plan, including money spent for the development of uranium enrichment, has always been included in the CNEA budget, which is part of the nation's general budget. This budget is made public, and free access is provided so that anyone who is interested can obtain this information.

In addition, starting in 1976, at the end of each fiscal year the CNEA has invariably made a complete report of its accounts available to the public by means of press conferences which have been reported in all of the media. It has also published annual reports containing information on its budget and resources.

## Energy Policy

Energy has great strategic value for a nation's independent development. Replacing the consumption of fossil fuels by the combined use of hydroelectric power and nuclear power is an appropriate energy policy for Argentina.

The first resources can be used primarily to satisfy peak demand--that is, the peak surge of electricity demand which occurs at given hours of the day--and the second as a base source to provide the minimum amount of energy needed by Argentina 24 hours a day all throughout the year.

Long-term planning should ensure that by the end of the century Argentina's principal, economically attractive hydroelectric resources will be in operation.

To meet the future expansion of the electricity market, then, Argentina will necessarily have to resort to an intensive reliance on nuclear energy, making use of its rich uranium reserves, since other alternative sources, such as solar energy, wind power, and geothermal energy, will only be able to meet a small percentage of future demand. This expansion will require no less than 600 Mwe a year of nuclear origin. This means that we should develop our own capability in the nuclear field, in order not to burden our balance of payments and also to turn around our dependence on foreign sources, for in this field strings can be attached in order to try to impede our independent development.

### Planning for the Nuclear Energy Sector

In accordance with this strategy, in 1979 the nuclear plan was defined as part of our national electrical equipment plan. This came about as a result of a careful study of the possible future electricity demand.

The existence of the plan was an essential condition for stimulating the participation of local industries and engineering in order to guarantee continuity of action and to define a certain future for them, so that those sectors could evaluate their possible participation on a sound basis and schedule the amortization of the requisite investments.

Those two national sectors--industry and engineering--are essential for achieving a true capability to handle our own development.

The nuclear plan was submitted for the consideration and approval of a commission composed of representatives of the ministries of the economy, interior, defense, and foreign relations, the departments of energy, science and technology, planning, and the National Atomic Energy Commission.

One factor that was given great consideration was the experience we had in 1977 when Argentina could not respond satisfactorily to the daily electricity demand because of a lack of machinery in service; at that time, Atucha I played an important role because of its high degree of reliability and its low generating costs--the lowest of all the sources of electricity, including hydroelectric power. This condition has not changed since that time.

The plan approved calls for the installation of four nuclear power plants using natural uranium and heavy water, each with a net power of approximately 600 MWe, to begin service in 1987, 1991, 1994/95, and 1997, in addition to the nuclear facilities required to master the fuel cycle and to produce heavy water.

The philosophy behind this structure was intended to gradually create an Argentine capability for the design, construction, assembly, and operation of nuclear power plants, along with a capability for an independent production of the components and resources these plants need in order to function. According to this plan, for the fourth plant Argentina is to provide 100 percent of the engineering, 100 percent of the construction, 95 percent of the assembly, the manufacture of at least 65 percent of the electromechanical components, and the total production of fuel elements and heavy water.

#### Cost of the Nuclear Plan

The estimated investment in our nuclear plan is about \$7 billion.

The plan, by means of its sound rate structure, is being totally self-financed through the sale of electricity to be generated during the lifespan of the plants. Since it is only feasible to count on long-term financing for goods and services of foreign origin, in order not to impede our objective of promoting national participation, it is necessary to provide a temporary input of funds during the project construction phase. A financial return will begin when the first power plant built under this plan starts to operate.

The figure cited is given in dollars only as a reference currency, since these investments, in accordance with the



objective we are seeking, are increasingly being made in our national currency.

### Technological Development

I am certain that through the nuclear plan we are going to keep from being left behind in this technological revolution that is now taking place.

It is quite well known that at the beginning of this century Argentina occupied a privileged position among all the nations of the world, while today we are relegated to a lesser role. Among other reasons, this is so because we fell behind in the industrial revolution, remaining locked into an economic system based on agricultural production. Our agricultural production did not grow sufficiently; on the contrary, our exportable surpluses declined, due to the rise in domestic consumption and the lack of agricultural technology.

Today the technological revolution shows that investment in research and development is one of the best ways of generating income. This is proved by the high standard of living of the more advanced countries, which are more developed because they conduct research and produce technological innovations, which can then be sold at great profit in the international market.

Our nation has been relegated to its level of development largely because of our low level of investment in research and development. This is reflected in the fact that over 90 percent of the patents issued in Argentina are of foreign origin, and also that a large part of the creative talents produced by our educational system emigrates for lack of incentive and places in which to pursue a career.

In order to turn this situation around, we must invest more in research and development, and we must carefully select areas in which to concentrate our resources.

There can be no doubt that one of the most promising areas is nuclear development, in which Argentina has already intelligently created a very strong infrastructure of human and material resources ensuring immediate results in a high-tech field.

This was perceived in 1976, and in that year our investment grew from 0.25 percent, until in 1983 it amounted to 1.17 percent of our Gross Domestic Product.

Of this money, 80 percent was spent on investment, 8 percent on personnel costs, and only 12 percent on current spending, including the costs of operating the nuclear power plants and all the factories, plants, and atomic centers operated by the CNEA.

The results of this investment can be seen today: Argentina has undertaken the construction of its own nuclear power plants; our national engineering capacity is able to handle the detailed engineering for nuclear power plants and also to assemble them; our industry is manufacturing the principal components needed by the nuclear sector and is providing 40 percent of the electro-mechanical components. This is all being done with the high level of quality demanded by nuclear technology. We are providing high-tech electronic systems in the sector of instrumentation and control; we have totally mastered the technology for the nuclear fuel cycle, covering the phase from exploration up to the manufacture of fuel elements. We have also developed so-called sensitive technologies which have led to our mastery of enriched uranium technology, placing us among a highly select and very small group of countries.

As a byproduct of this, we have developed a number of advanced technologies, opening up very favorable prospects for exports outside of Argentina's traditional fields.

Therefore, our nuclear plan should also be viewed as a suitable means--in Argentina it is almost the only one--for generating our own technology, both nuclear and non-nuclear, producing a high added value, and one which offers promising possibilities of increasing our national wealth and power, thus enabling us to combat our problems of underdevelopment.

#### Impact on our Foreign Policy

In all meetings with foreign ministers and heads of state, the nuclear issue is nearly always raised. This shows the importance of this topic in international relations.

It is clear that the higher a country's level of nuclear development and the fewer restrictive policies it has on this technology, the more weight that country will carry in the international field for achieving its national objectives.

This gives some idea of the important contribution made to the integration of Latin America by the cooperation which Argentina

is offering its neighbors in the field of peaceful uses of nuclear energy. This cooperation program has established new and solid ties with the other nations of South America. Such ties obviously help to avoid any possibilities of conflict.

In addition, having managed to develop these so-called sensitive technologies without foreign assistance gives Argentina an important tool for improving its position in dealing with the more advanced countries, thus giving us better conditions for working out solutions to our problems in the international field.

#### Final Comment

With these remarks I have attempted to provide some useful information so that the nuclear plan may be evaluated in an integral form, that is, as a motivating force for economic activity, as a strengthening force in areas as vital for Argentina as energy, industry, engineering, and science and technology, and as a means of keeping and raising the capacity of our skilled human resources. In summary, the nuclear plan is a tool for improving our relative position in the world.

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CSO: 5100/2060

## NUCLEAR FIRMS ADVANCE LEVEL OF TECHNOLOGY TO MEET OBJECTIVES

Buenos Aires ENERGIA NUCLEAR in Spanish No 14 1983 pp 47-49

### [Excerpts] Fuel Elements Enterprise

The manufacturing technology developed in a pilot plant, the trained personnel and the equipment were transferred to the Nuclear Fuel Elements Enterprise (FECN).

The enterprise is equipped to produce the fuel used by at least three nuclear powerplants: Atucha I, Embalse and Atucha II. Its production will make it possible to generate 11,500 GWh of electric power per year. For this purpose, 240 tons per year of uranium, and 55 of zircaloy will be required.

The Fuel Elements Enterprise built by CNEA, [National Commission for Atomic Energy] to supply its nuclear electric powerplants is located on the premises of the Ezeiza Atomic Center, on the outskirts of Buenos Aires; it has a covered area of 11,600 square meters and is provided with infrastructural services suited for the specific purpose, particularly control of humidity and temperature in the main manufacturing locations and quality control.

Figure 6 shows the section associated with the manufacture of ceramic cores.

In Figures 7 to 11, one may observe other features of the enterprise.

### Industrial Company

To operate the FECN, CNEA, together with local firms based on native capital, has established the corporation Argentine Nuclear Fuels (CONUAR, Inc). It was legally instituted in early December 1981, and the enterprise was opened on 2 April of this year.

CONUAR leases the FECN facilities from CNEA, and purchases from CNEA and from third parties the necessary equipment and input for manufacturing fuel elements except for uranium dioxide, which it receives in use.

CNEA provides CONUAR, on a purchase basis, all the technology required for the manufacture of fuel elements, retaining the right to ownership thereof, and holding the licenses in its name in the instances wherein they exist.

CNEA retains strategic control of the firm.

FECN's input consists mainly of Zry-4 and uranium dioxide ( $UO_2$ ). Other special materials used are: stainless steel, helium and argon, liquid nitrogen, high quality hydrogen, beryllium and graphite of nuclear purity.

CONUAR has started manufacturing the Atucha I type fuel elements, using cladding and semifinishes of Zry-4 that are currently of imported origin.

There will be an increasing use of cladding and semi-finishes of Zry-4 that are produced in CNEA's Special Alloys Factory (FAE) for the manufacture of fuel elements for the three aforementioned nuclear powerplants. Starting in 1984, plans call for all the Atucha I type fuel elements to use native Zry-4.

On the pilot plant level, 11,000 meters of Zircaloy-4 pipes are being manufactured, this being one of the final phases thereof.

The natural  $UO_2$  is the fissionable material used in the native power reactors. Approximately 270 tons per year of this material (240 tons of uranium) are required for the three lines.

CONUAR uses  $UO_2$  produced in Germany from native uranium concentrate for the manufacture. In 1983, plans call for CONUAR to start using  $UO_2$  powder produced at CNEA's Cordoba Manufacturing Complex.

FECN began its industrial activity with the manufacture of fuel to supply CNA I [Atucha I Nuclear Powerplant], with an anticipated consumption of 400 fuel elements per year. The first deliveries took place starting in May 1982, at an approximate rate of 30 nuclear fuel elements per month.

At present, it has delivered 172 fuel elements, having manufactured 188 as of 19 October last.

It is of significant importance to note that the total cost of the development of the technology, considering all the investments made, including trips abroad to receive equipment, etc., and taking into account the economic value of the equipment moved to the plant and of the fuel elements manufactured and used at the nuclear powerplant, amounted to the sum of \$5.108 million, most of which was collected from CONUAR as the price of the technology, and has been included in the cost of the fuel element.

Under these conditions, including the payment of rent for the use of the manufacturing building, and without subsidies of any kind, it should be stressed that the fuel manufactured in the country has proven to be cheaper than that imported, considering the price of the last bid from the supplying firm in 1980; which underscores the significance of this achievement that, in addition, creates assurance for the supply.

If one also considers the fact that the economic production scale will improve notably when the Embalse nuclear fuel manufacturing lines go into operation

in 1984 (with a reduced series), and completely in 1985, and, subsequently, the line related to Atucha II, it may be claimed unhesitatingly that technological, economic and strategic success has been attained.

Based upon results, it may therefore be said that every peso invested in research and development has been returned and, if a complete assessment is made, this statement is in agreement with those in the leading industrial countries basing their strength on technological innovations who claim that \$2.00 are accrued for every \$1.00 invested in research and development.

In another area of activity, the National Commission for Atomic Energy has in an advanced state of development the technology relating to the CANDU type fuels for the Embalse Nuclear Powerplant, and the pertinent machinery for the industrial manufacturing process.

These fuel elements, of a different design, have significant variations in their dimensions and weight in comparison with those of CNA I. Their length is 50 cm and their total weight is 23 Kg, of which 19 Kg are associated with  $UO_2$  (17 Kg of uranium). They have 37 fuel bars provided with soldered plugs, which are kept stiffly in position by two Zry-4 end grids.

During 1983 and 1984, reduced series of these fuels will also be produced. Starting in 1985, it is planned to have CONUAR, Inc produce all the fuel elements required to supply the Embalse Nuclear Powerplant's operation.

This will be associated with a manufacturing technology developed by the National Commission for Atomic Energy, including major production equipment that will be moved to the enterprise, together with properly trained personnel and the equipment necessary for industrial production.

As for Atucha II, CONUAR, Inc will manufacture the fuel elements of its first core during 1985 and 1986; and it is planned to have it supply all the fuel elements required for the three aforementioned nuclear powerplants starting in 1987.

The Atucha II type fuel element, although currently under development, will have features similar to those of the Atucha I type, but with 37 bars, the diameter of which will be 1 mm larger, and with greater simplicity in the intermediate separators.

For the type of production system used by the three nuclear powerplants, estimated as based on 240 tons of uranium per year, as has been noted, CONUAR, Inc will have a personnel contingent of approximately 300. In 1982, with the sole production of Atucha I type fuel elements, the personnel roster consists of 120 employees.

The quality demanded for the fuel elements necessitates highly qualified personnel, not only for the quality control work, but also in each and every one of the phases of the manufacturing process. Most of the aforementioned personnel were trained at CNEA's pilot plant, in the pertinent specific tasks.

It is a noteworthy fact that, because of the high degree of reliability demanded for nuclear fuel, its manufacture involves the maintenance of a quality control infrastructure far superior to that usually present in the conventional electromechanical industry.

With the completion of this important phase, we believe that the National Commission for Atomic Energy has taken an all-important step in attaining its goal of self-sufficiency in the supply of nuclear fuel.

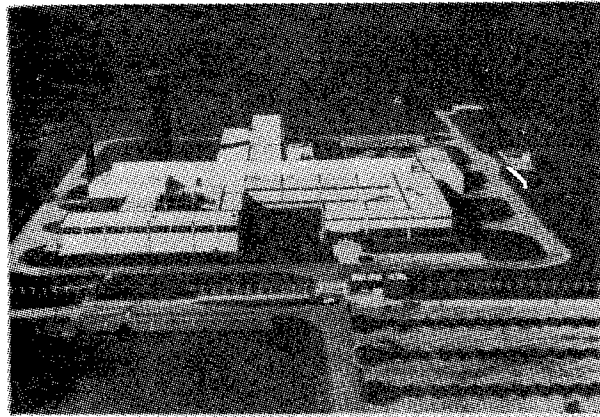


Figure 5: Nuclear Fuel Elements Enterprise (FECN) at the Ezeiza Atomic Center

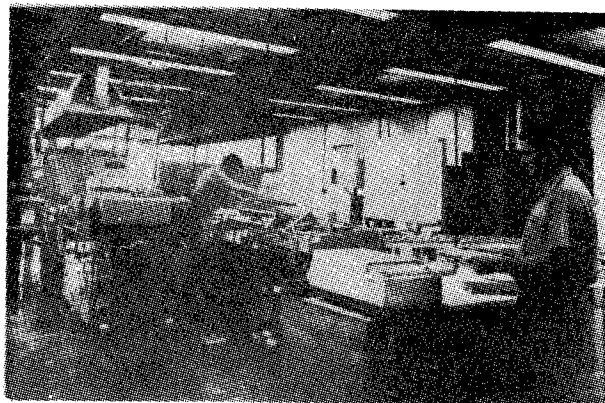


Figure 6: Ceramic core manufacturing section of FECN

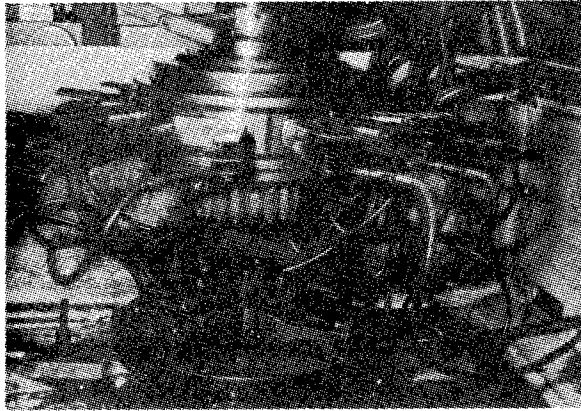


Figure 7: Electroerosion machine for separator manufacture (electrode positioner)

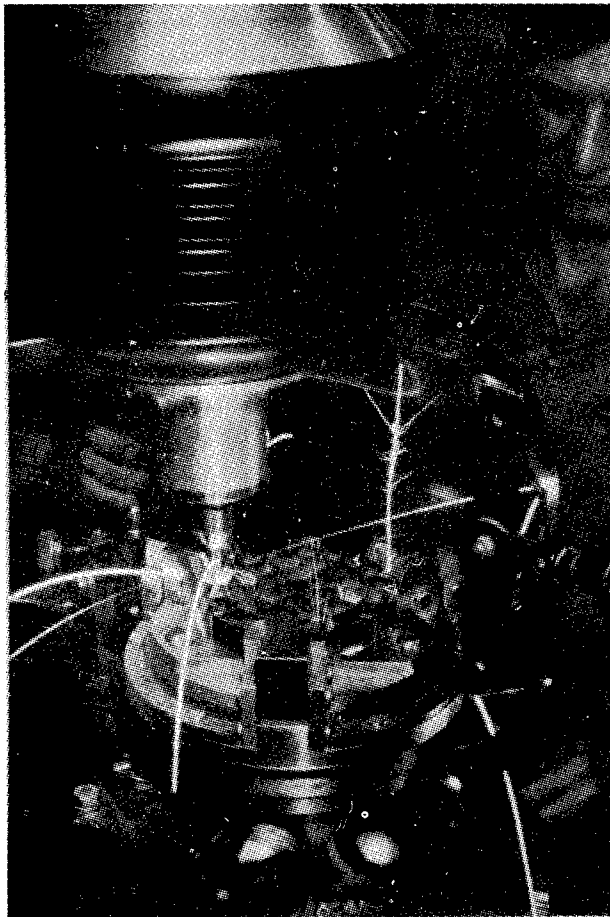


Figure 8: Rectification of the seating of the fuel bars in the separator meshes



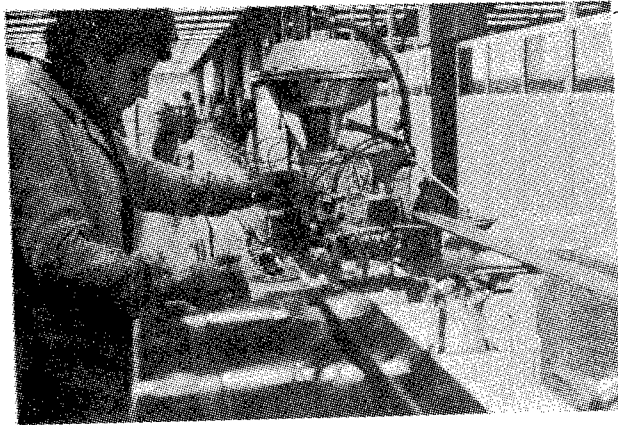


Figure 9: TIG soldering of the plug-cladding connection

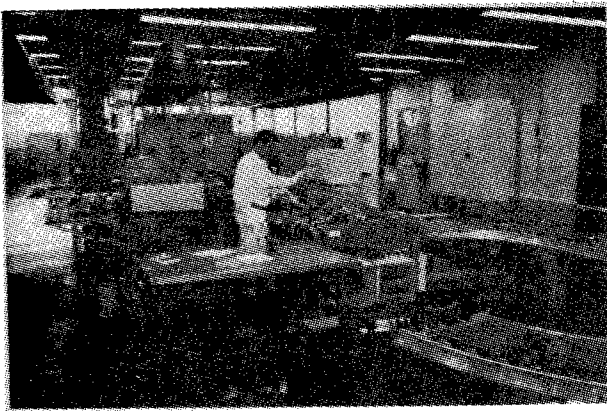


Figure 10: Cake machining

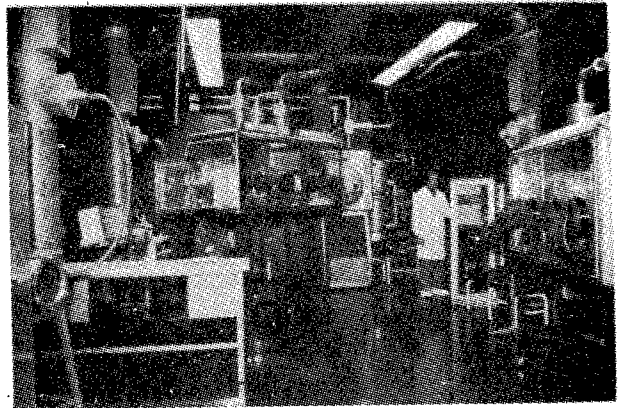


Figure 11: Area for soldering with Be  
(brazing process)

2909

CSO: 5100/2600

DECISION TO PROCEED WITH ENRICHMENT PLANT OPERATION SCORED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Jan 84 p 3

[Editorial article: "The Year of Fateful Decisions"]

[Text] Before, it was the urgent need to generate energy. Now the need is to enrich uranium to produce the atomic bomb. Everything that was true before is now a lie. In mid-1975, the Geisel administration insisted that it was a priority matter to develop the burdensome nuclear program for the basic purpose of installing eight reactors designed to supply the energy demand at the end of the eighties. Of little avail were the exhaustive arguments of the experts of the Brazilian Electric Power Stations Corporation (ELETROBRAS), proving that Brazil's hydroelectric potential was sufficient to take care of consumption up to the first two decades of the 21st Century, or more. Of little avail, too, was the proof that the idle national coal reserves were perfectly adequate for a prudent thermal supplementation.

ELETROBRAS' figures pertaining to the real Brazilian hydroelectric potential were deliberately deflated only to justify to public opinion--that poor public deceived so many times!--the approval of the showy \$30-billion project for the execution of a nuclear program that basically benefited German industry, with at least eight orders for power generators cancelled, strangely the same number of units originally contracted by Brazil.

Many billions of dollars were lost in that unpunished adventure. Some speak of \$3 billion; others about an obligation of \$7 billion. The truth is that now, under a new administration, the Brazilian Nuclear Corporation (NUCLEBRAS) is removing the mask and revealing to the nation what O ESTADO had been charging: the primary objective of the nuclear program is no longer the generation of energy. What was valid before--namely, the need to install a minimum of four nuclear plants and a maximum of eight to make possible the enrichment of uranium and the production of plutonium--is no longer true. At least, that is what one can conclude from the statements made by the president of the company in announcing that the Angra-II project will be slowed down and that the starting schedule of Angra-III will also be cut back. The meager funds that remain after payment of the foreign debts will be appropriated to the uranium enrichment plant. But why was that not done before so much money was spent?

That decision closes a dramatic balance of what remains of the nuclear program, a crime against the economy of a country, impoverished by the accumulation of blatant errors perpetrated during the Geisel administration. As a matter of fact, according to Dario Gomes, the president of NUCLEBRAS, out of a budget of 1.067 trillion cruzeiros, the company will spend 885 billion in paying foreign obligations, half of it in interest! Or rather, it will pay the German industries and banks 81 percent of its total budget. That means that the whole program was built turned toward a dangerous dependence on a foreign country, whose banks are absorbing at least 460 billion cruzeiros (of the 885 billion) in the payment of interest and a minimum amortization of the debt.

Those figures are blatant. They show the absurdity of the whole original program, the cost of a minimal part of the program designed originally to take care of the German companies, supported by their government, which promised us the technology of the whole uranium cycle: from research to mining, to enrichment and processing, and now erect obstacles to our obtaining vital parts for a factory the operation of which is essential for mastery of the atomic cycle.

At a time when it is confirmed that NUCLEBRAS is now concerned about building the industrial process for the enrichment of uranium, one easily comes to the conclusion that the objectives in view at the time of the signing of the nuclear agreement were not as peaceful as one was led to believe. Which shows once again the incompetence with which serious matters are discussed in Brazil, especially by those in the government who are responsible not to take false steps.

The reports about NUCLEBRAS' endeavor to put the uranium enrichment factory into operation raises anew the debate on the question of nuclear weapons. It is not an unimportant matter, especially when one sees that NUCLEBRAS had a larger budget than Itaipu and that the budgetary grants for nonconventional and nonpeaceful research are not publicly known. The building of an atomic bomb is not a matter that can be resolved within four walls, decided by those who see the most obvious but not always most correct military aspects and think in simplistic equations: if Argentina has already mastered the uranium enrichment process, Brazil must do so also.

That is not the way to deal with a problem of that magnitude. The nation is bitter over the dream of the nuclear plants, essential for those who liked to live in the nightmare of nuclear power to be able to arrive at the enrichment of uranium and the reprocessing of plutonium. At a time when it has already become obvious that it is not feasible to carry out the agreement with Germany, it is not possible to insist on the enrichment of uranium, evidently to build the nuclear bomb, without society being informed and without the nation deciding. As always happens in Brazil, one day we will learn that we have already mastered the whole atomic cycle and that it is possible for some "X-BRAS" to build the bomb.

No one will gain from that policy. It is to that problem that the future president of the republic must direct his attention because the fateful decisions will be adopted after 1985.

8711

CSO: 5100/2063

## BRAZIL

### BRIEFS

U.S. NUCLEAR NEGOTIATIONS--Itamaraty spokesman Bernardo Pericas has termed as groundless a statement published by the U.S. Chamber of Commerce bulletin in Sao Paulo. The government spokesman said that U.S.-Brazilian negotiations on nuclear cooperation have not been frozen. Quite the contrary, there is a special commission analyzing this issue, and its final report will be studied next month when U.S. Secretary of State George Shultz visits our country. [Text] [PY261852 Sao Paulo Radio Bandeirantes Network in Portuguese 1000 GMT 26 Jan 84]

NUCLEMON PROFITS, CDTN LABORATORY--Rio--The NUCLEBRAS Monazite and Associated Minerals Corporation (NUCLEMON), a subsidiary company of the Brazilian Nuclear Corporation (NUCLEBRAS) group earned revenues of more than \$1 million in 1983 from the export of its products to the United States, Austria, the Netherlands, France and Japan, representing an increase on the order of 222 percent over the previous year. In the area of sales to the Brazilian industrial park, NUCLEMON increased its revenues by 166 percent, which last year amounted to 5.6 billion cruzeiros. In 1984, the company plans to develop its activities in Rio de Janeiro, Espirito Santo, Bahia and Sao Paulo. NUCLEBRAS announced yesterday that a testing laboratory designed to test valves of nuclear power stations, the only one of its kind in Brazil, is scheduled to go into operation this year in the Nuclear Technology Development Center (CDTN) in Belo Horizonte. The laboratory will also be equipped to test other components intended to operate permanently in a nuclear reactor. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 14 Jan 84 p 22] 8711

CSO: 5100/2063

## GUATEMALA

### BRIEFS

SEARCH FOR URANIUM STARTED--This year a search for uranium will be started in Guatemala pursuant to a project financed by the International Atomic Energy Agency. This information was released by that country's atomic energy director, Eduardo Pineda Gonzalez. The official explained that this is the first time his country will conduct an exploration program to find this valuable ore. According to the experts, Guatemala possesses geologic characteristics very similar to those of Peru and Mexico where it has already been determined that uranium is abundantly present in the subsoil. "In this country," Pineda Gonzalez emphasized, "we are not ruling out the possibility that uranium may be present. Because of this strong possibility, a agreement has been reached between the ministry of energy and mines and the corresponding international organization to implement the above-mentioned project this year." "Within the framework of this same exploration program," he said, "we will at the same time implement projects to detect the presence of radioisotopes for agricultural use." The exploitation of uranium in the subsoil of Guatemala will give unprecedented economic impetus to this country, since this mineral is in great demand for nuclear energy purposes and for medical applications, it was said. For its part, the International Atomic Energy Agency is preparing to begin its operations in the next few days, with excellent prospects of success in its explorations. [Text] [San Salvador LA PRENSA GRAFICA in Spanish 9 Jan 84 pp 3, 29] 8143

CSO: 5100/2067

## AEC CHAIRMAN, GANDHI DISCUSS SOVIET H-PLANT OFFER

Madras THE HINDU in English 24 Dec 83 p 1

[Article by G. K. Reddy]

[Text]

NEW DELHI, Dec. 23.

The chairman of the Atomic Energy Commission, Dr. Raja Ramanna, who led a five-member delegation to Moscow earlier this month to discuss the Soviet offer to set up a giant nuclear power plant in India, met the Prime Minister, Mrs. Indira Gandhi, today to give her his assessment of the inherent advantages and disadvantages of opting for another fuel cycle system.

He was sent to Moscow to look into the political, economic and technological aspects of the Soviet offer from the point of view of India's capacity to absorb and develop two parallel systems even assuming that the safeguards applicable in both cases would be acceptable to it.

The Tarapur plant built by the U.S. uses enriched uranium and natural water for its two reactors with a total output of 420 MWe, while the Rajasthan plant based on Canadian designs is fuelled by natural uranium which is moderated by heavy water in its two units with a combined capacity of 440 MWe. The Kalpakkam and Narora plants have two standardised reactors each of 235 MWe fabricated in India, with a capacity of 470 MWe in both cases, using the natural uranium and heavy water system.

### Design excellence

The Indian atomic delegation, led by Dr. Ramanna, has returned highly impressed with the technological excellence of the Soviet designs and operational efficiency of its nuclear power plants. Though the Soviets are building giant reactors of 1,000 MWe each for some of their super power plants, the great majority of the new ones under construction in the Soviet Union itself and countries of eastern Europe will have 440 MWe reactors, which are being mass produced at the Tomash complex in Ukraine at the rate of eight big plants a year.

The original Soviet offer, first made by Mr. Kosygin in 1979 to Mr. Morarji Desai and repeated by Mr. Brezhnev to Mrs. Gandhi in 1982, was for a giant single reactor power station of 1,000 MWe which would have required an altogether new grid since the existing one in the country could not cope with it. So the Soviets suggested that India should go in for two

440 MWe reactors instead of one 1,000 MWe unit.

But India has yet to make up its mind whether it would be desirable to accept this offer and develop a second fuel system, since the Soviet-built reactors will have to be run with imported enriched uranium, which could lead to political complications as has happened in the case of the Tarapur plant. One view within the atomic establishment is that India should concentrate on standardising its nuclear power plant designs based on natural uranium and light water systems, while another school of thought feels that the Soviet offer should be accepted if Moscow is prepared to assist India in setting up a uranium enrichment facility using the new laser technology that is considerably superior and inexpensive compared to the centrifuge method developed in the West.

### Ultimate goal

It is essentially a matter for political decision at the highest level whether India should go in for an enrichment plant to become totally self-reliant in fuel supply for the new Soviet-designed nuclear power stations. It is bound to lead to a big outcry in the West that India is indirectly acquiring the capability to exercise the nuclear option, although it could do the same by using the reprocessing facilities already in existence.

All these aspects will have to be carefully considered, both at the political and technical levels, to assess the plus and minus factors of developing simultaneously two different fuel systems, while the ultimate goal is to base the country's nuclear power programme on fast breeder technology using plutonium fuel instead of enriched uranium. The Government will have to study also the implications of the new safeguard obligations, if India purchases enriched uranium and returns spent fuel to the Soviet Union, or establishes its own enrichment facility with Soviet help leaving the country free to reprocess the spent fuel under agreed conditions.

It will take at least a year to arrive at a final conclusion on what terms India should accept the Soviet offer, after examining carefully its political, economic and technical implications. And in any case the Government is in no hurry to arrive at a decision.

## WORK PROCEEDS ON NEW HEAVY WATER PROJECT

Madras THE HINDU in English 29 Dec 83 p 19

[Text] Work on the country's biggest heavy water project, started in September 1982, is going on briskly at Manuguru about 35 km from Bhadrachalam in Khammam district of Andhra Pradesh on a 346-hectare site in the coal belt on the banks of the Godavari. It is expected to be ready in five years.

The main source of heavy water production is water from the river itself. Enormous quantities of water and coal are required for the production of heavy water.

The plant will have a capacity to produce 200 tonnes of heavy water annually. The experience and knowhow gained in the commissioning of the Kota project in Rajasthan have been incorporated in designing the project.

Based on the hydrogen sulphide-water exchange process, enrichment will be carried out by dual temperature chemical exchange between water and hydrogen sulphide.

**Indigenous:** Despite the toxic and corrosive nature of hydrogen sulphide and a yield of only 15 per cent of heavy water in this process, this is preferred as it is indigenously developed at the Bhabha Atomic Research Centre (BARC), Trombay.

The plant consists of a number of 300-tonne stainless steel process towers 60 metres tall and one metre in diameter.

Normal water will be initially treated to remove minerals and converted into steam to be fed into the process towers. Part of the steam will be utilised to run a 60 MW captive power station which will make the plant self-reliant in power.

CSO: 5100/7042

DELHI UNCERTAIN ABOUT RAJASTHAN NUCLEAR PLANT

Bombay THE TIMES OF INDIA in English 25 Dec 83 p 1

[Text] New Delhi, December 24.

Uncertainty over the first unit of the Rajasthan atomic power project was reflected today in the government's inability to commit itself to a timetable for its recommissioning.

Considering the history of the trouble-ridden power plant and the results of efforts made till now, a member of concerned parliamentary consultative committee wondered today whether the plant, suffering from the leakage of light water, would have to be scrapped.

The chairman of the atomic energy commission, Dr. Raja Ramanna, did not agree that the plant would have to be written off but pointed out the hard task that lies ahead for scientists and engineers struggling to get it started again.

The government told the parliamentary consultative committee that it was not possible to state when the unit would be started again after repairs.

A chemical sealant was tried earlier to plug the leak but it did not work for long and the light-water leak from the south end shield recurred in March last year.

Locating the Defect

Since the course of action at every step largely depended on the result of previous tests, it was not possible to estimate the time to be taken for recommissioning the power unit.

Mock-up work for training the personnel for repair work in a highly radioactive area with complex and remote tooling had been completed. The lattice tube of the end shield in the suspect location had been cut and removed and ultrasonic tests of the bore carried out. The results indicated that further investigations were necessary to determine the nature and extent of the defect and the repair procedures that would be required.



In reply to another question, it was stated that a proposal for separate organisations for construction, maintenance and operation of nuclear power stations was being considered by the government.

However, from further questions and answers it transpired that the government was not very enthusiastic about the proposal, and it reiterated the old argument that the atomic energy department needed to execute these directly since the activity required constant support of research institutions.

CSO: 5100/7041

## INDIA

### STATE-OWNED URANIUM CORPORATION PLANS EXPANSION

New Delhi PATRIOT in English 31 Dec 83 p 7

[Text] The State-owned Uranium Corporation of India Limited (UCIL) has a big expansion programme for the coming years, reports PTI.

Work is expected to commence during 1983-84 for setting up a uranium recovery plant adjacent to the copper concentrator of the Hindustan Copper Limited at Mosaboni in Bihar.

A project report for this purpose has been finalised, according to the annual report of the UCIL for 1982-83 which was presented to Parliament during its just-concluded winter session.

A uranium recovery plant from copper tailings of the Rakha copper plant of the Hindustan Copper Limited was commissioned for production early this year.

The report says work at the Bhatin mines project is progressing satisfactorily and is expected to be completed in about three years.

Expansion of township at Jaduguda, is expected to be completed during the next financial year.

The Uranium Corporation of India was set up in 1967 with its registered office at Jaduguda with the primary object of producing uranium required for the Indian nuclear power programme.

The association of uranium with copper in the mineral zones of the Singhbhum thrust belt of Bihar has been known for a long time. Since the early 50's intensive exploratory work on uranium, aided by laboratory research, has been going on in this area.

Also known as the Singhbhum copper belt, this 160 km long belt has perhaps the highest potential for deposits in the country. Here uranium and copper are sometimes found with nickel, molybdenum, apatite-magnetite and kaynite deposits.

The more important uranium deposits (located from east towards the west) are those in Dhanuppa, Bhalki-Kanyaluka, Surda, Jaduguda, Narwapahr, Girdih, Keruadungri, Tamadengri and Bijay.

Exploratory drilling in the Surda area indicated the presence of a fan-shaped ore body, up to a depth of 166 metres from the surface having a potential of about 0.26 million tonnes of ore of an average grade of 0.05 per cent uranium oxide.

Jaduguda is by far the best explored deposit in the belt. Extensive exploration by deep drilling has been carried out. The indicated resources are of the order of four million tonnes, the ore grade being 0.167 per cent of uranium oxide.

The Bhatin deposit is some 3.2 km away from Jaduguda. Down to 300 metres depth, the indicated and inferred ore resources have been estimated at about the million tonnes of 0.045 per cent of uranium oxide.

About 7.300 metres of drilling to depths of 50-300 metres in the Narwapahr area has indicated a 3.5 metre thick lode, and ore reserves over a million tonnes of 0.077 per cent of uranium oxide.

During 1982-83, UCIL achieved an increase turnover of Rs 1 030.6 lakhs as against Rs 951.2 lakhs in the previous year.

The production of uranium concentrate during the year was the highest since the commence of the company's operations in 1968.

CSO: 5100/7043

## BRIEFS

NEW RESEARCH UNIT--New Delhi, December 27: The country's second-largest centre for nuclear research is to be set up on the Jawaharlal Nehru University campus here. It will be next only to the Bhabha Atomic Research Centre at Trombay, Bombay. The new nuclear science centre, which is to be set up at a cost of Rs. 40 crores, will serve as a national research facility to be operated jointly by all universities for research in physics, chemistry, biology, medicine and other related fields. The University Grants Commission has set up an 18-member steering committee, headed by its chairman, Dr. Madhari Shah, to ensure the project's smooth implementation. In a letter to the JNU authorities, the UGC has said that the proposed major facility is expected to be ready by 1988. A ten-hectare plot for the centre has been chosen at the south-end of the campus. In the first phase of the project, a pelletron linear accelerator will be set up. It will be coupled later to a super conducting cyclotron. It is around this facility that the bulk of the research will be conducted. The centre's director will be named shortly by the UGC. [Text] [Bombay THE TIMES OF INDIA in English 28 Dec 83 p 1]

CSO: 5100/7041a

SCIENTIST CLAIMS WESTERN MONOPOLY IN ENRICHING URANIUM BROKEN

Paris AFP in English 1959 GMT 9 Feb 84

[Text] Islamabad, 9 Feb (AFP)--A leading Pakistani nuclear scientist today said making an atomic bomb here would need only a political decision and Pakistan's nuclear capability was years ahead of India's.

"We have broken the Western monopoly in the technique of enriching uranium," he told the Urdu language daily NAWA-E WAQT. "Making an atom bomb (...) is not very difficult," he said.

The technique acquired by West Germany, Britain and Holland after twenty years of work at the two billion-dollar Almelo Vilot project in Belgium, has been attained by Pakistani scientists in a short period, he said.

Dr. Khan was found guilty of nuclear espionage by an Amsterdam court last year and sentenced to four years in prison in absentia.

He said Pakistan's nuclear programme was geared to peaceful ends, but if the president, "in the interest of the safety and security of the country," as a last resort assigned Pakistani scientists to the mission, "they will not disappoint the nation."

"If India could explode a nuclear device ten years ago, we are not so dull-minded not to do it today," he said.

His comments followed rumours in the Western press about an "Islamic bomb" in Pakistan. Senior government officials here have persistently denied the rumours which Dr. Khan called a stunt and "a product of the Zionist mind."

CSO: 5100/4706

PFP YOUTH URGE GOVERNMENT TO SIGN NUCLEAR NONPROLIFERATION TREATY

Capetown THE CAPE TIMES in English 9 Jan 84 p 9

[Text]

THE Progressive Federal Party Youth branch has called on the government to state that it will not develop a nuclear weapons capability.

The resolution, adopted at the youth branch's national congress in Pretoria on Saturday, also noted that South Africa had the ability to make nuclear weapons and demanded that South Africa sign the nuclear non-proliferation treaty.

The resolution called on the PFP to monitor South Africa's nuclear industry to "ensure that South Africa does not acquire nuclear weapons".

● A spokesman for Koeberg Alert, Mr John Venn, has released a statement in support of the resolution.

Koeberg Alert agreed that nuclear weapons were "grossly immoral

because their use will indiscriminately kill millions", and denounced as "ambiguous" South Africa's denial that it was developing a nuclear capability.

According to the statement, one of Koeberg Alert's major concerns was that if international agreements lapsed, spent nuclear fuel from Koeberg could be reprocessed to make nuclear weapons.

Koeberg Alert urged the Atomic Commission to make public the provisions made with regard to the use of spent nuclear fuel, and the plutonium in the fuel, from the Koeberg nuclear power station.

"It is difficult to understand why there should be a shroud of secrecy around what is, after all, a civilian installation," Mr Venn's statement read.

CSO: 5100/17

REACTION TO 'THE DAY AFTER' REPORTED

Johannesburg THE CITIZEN in English 27 Jan 84 p 13

[Article by Gordon Engelbrecht]

[Excerpt]

But how terrifying is "The Day After," and to what extent does it convince audiences of the dangers of our time?

The Citizen posed these questions to members of a select group who saw the film at a special preview last week.

TV and Radio personality Christopher Dingle considers it "as subtle as a Pik Botha speech. The basic concept is good, but it is badly handled."

He continued: "It does not have the persuasive subtlety of a film like 'On the Beach', in which the makers were able to terrify one with shots of deserted streets rather than horrific but obvious effects. I am surprised that

80 million Americans were reportedly shocked by it. I honestly wasn't, but then I don't live next to a nuclear base."

Leading Johannesburg PRO Tina Sole did find it terrifying.

"Technically it isn't wonderful," she said, "but the lead up to the holocaust illustrates how easy it will be to get into that sort of situation. I found that particularly frightening, especially since it is obvious that the people at the top don't care about the man in the street. They have their own protection against such an event."

Award-winning SABC-TV costume designer

Roux Engelbrecht considers it a "phoney depiction of events which never convinced me. Several of the scenes are in bad taste because they exploit people's fears, while the effects and make-up are among the worst I have ever seen. Far from being frightened, I found parts of it unexpectedly amusing."

Actor Errol Ross who is on a visit to his home country whilst enjoying a break from the San Franciscan hit show "Cloud Nine," saw the film when it was originally transmitted in the US.

"Showing it on the wide screen magnifies its faults and destroys much

of its effectiveness," he commented, adding "I hope that its message still comes across, but believe it should be shown on the medium for which it is intended."

SABC Researcher Rita Greenberg, ex-champion of the "21" radio quiz series, was shocked at the film's message. "After seeing it, I felt that the only thing I should do was go home and slit my throat. I couldn't even eat supper that evening. It that's all we are capable of, why do we bother?"

Disparate views, and a clear indication that "The Day After" is likely to be as controversial in this country as it has been abroad.

Nuclear Work Defended

THE Atomic Energy Corporation in Pretoria called on the public yesterday to view the controversial doomsday film, "The Day After" with an open mind and not to condemn the whole nuclear industry after seeing it.

The Corporation said a definite line should be drawn between nuclear weapons and their use, and the peaceful uses of

nuclear science to the advantage of man and its environment.

The film left the public of Europe and the United States in horror after its screening late last year. It portrays the destruction and misery of Europe and America after a full scale nuclear war between the US and Russia.

Mr Dries Sonnekus, Press liaison officer of the Atomic Energy Corpora-

tion, said yesterday that nobody was more conscious of the results of such an occurrence than the nuclear scientist.

"Simultaneously he also realises what tremendous advantages his technology holds for mankind if applied peacefully and with responsibility," he said.

"Should anyone feel like condemning the peaceful application of

nuclear technology as the result of the potential horror of nuclear weapons, he should firstly consider other forms of technology too.

"For instance, the motor car and the internal combustion engine, used daily on all war fronts of the world to sow death and destruction and also on the South African roads where thousands die each year".

AEC CHAIRMAN FINDS NUCLEAR POWER CHEAPER THAN COAL

Johannesburg THE CITIZEN in English 27 Jan 84 p 10

[Text]

IF pollution and environmental protection were the only factors to be considered, South Africa should be building only nuclear and not coal-fired power stations, Dr Wynand de Villiers, executive chairman of the Atomic Energy Corporation, said in Pretoria yesterday.

Dr De Villiers said it was a fact that a nuclear power station was much more sympathetic towards the environment than its coal-fired counterpart.

Boilers of a coal-fired station with a capacity of 2 000 MW will emit about 16 000 tons of ash and noxious fumes a day, Dr De Villiers said.

"In comparison nuclear power is much more acceptable in the environmental sense although it requires much higher capital investment than a coal-fired station.

"The cost advantage of nuclear power stations in use in other parts of the world, compared with coal, is that fuel and running costs are much lower."

It would be uneconomical to build a nuclear power station in the East-

ern Transvaal because this area has the cheapest coal in the world, Dr de Villiers said. However, nuclear power stations could be built on the coast because of the high price of transporting coal.

"Apparently people are quite willing to suffer the health effects of 'normal' pollution, but quite unwilling to accept the extremely small quantities of radio-active material emitted by nuclear power stations during normal operation, and which has been proved not to present any additional health hazard," he said.

Dr De Villiers referred to the drought in the Eastern Transvaal which stressed the vulnerability of coal-fired power stations at such times. This made the application of nuclear power at the coast even more sensible as sea water could be used for cooling purposes.

Regarding the Koeberg nuclear power station in the Cape, Dr De Villiers said many misconceptions existed regarding the capacity of the station.

"Koeberg reactors are comparable with those used in the rest of the world," he said.



SOUTH AFRICA

EXPERT INSISTS NUCLEAR ENERGY IS SAFE, ECONOMICAL

Johannesburg MINING WEEK in English 18 Jan 84 pp 1, 3

[Dr Ehud Finkelstein interviewed by Roy Bennetts]

[Text] In our issue of December 7, MINING WEEK carried an interview with Dr Ehud Finkelstein of the Chemical Department of Wits University opposing nuclear power stations. Dr Finkelstein used the terms "obsolete, expensive, dangerous and unreliable and important contributors to inflation".

The editors of MINING WEEK were contacted by a senior nuclear consulting engineer who felt that many points in the original interview were in fact not correct and were biased toward the anti-nuclear lobby.

This person cannot be named in this article due to the Official Secrets Act but it was considered only fair that both sides of this very emotive issue should be presented.

The editors of MINING WEEK do not hold sides in this discussion and are also satisfied with the credentials of the interviewee.

We have taken the individual points made by Dr Finkelstein and allowed the nuclear engineer to answer.

Dr Finkelstein "...a free enterprise economy has decided against the nuclear option mainly for economic reasons".

Nuclear consultant engineer: "Any new technology is expensive, the nuclear development programme naturally more so due to the stringent and often excessive safety regulations in force for the construction of a nuclear power plant.

"This will create a poor investment return in terms of profit for the private investor, and as the construction of a nuclear plant is many times that of a coal-powered plant, the loss on return, due to inflation and construction time, becomes even greater.

"Originally, the construction time of a nuclear power plant was around four years but this has risen to between seven to 10 years due to the increased safety regulations.

"There was an instance in America at the Tyrone station when the courts passed an injunction to stop work due to a farmer claiming that the station would endanger the bald-eagle.

"The fact that there were no bald-eagles in the area, nor had ever been, shows just how much people over-react to the situation."

Dr Finkelstein "...nuclear energy is adopted and promoted mainly in the more socialistic countries, such as France..."

Engineer: "The original nuclear energy plans were pushed ahead by the previous non-socialistic government, in fact the socialist (Mitterand) government has curtailed the nuclear energy programme in France and yet the present generation of electricity is closer to 50 percent by nuclear means.

"Japan is very heavily committed to nuclear development."

Dr Finkelstein "...in the United States nuclear electricity costs twice as much as 'conventional electricity'."

Engineer: "I would disagree with this. I believe the figure is in fact between 4-1 and 7-1 in favour of nuclear power for the production of a kilowatt."

Dr Finkelstein "...Browns Ferry twin reactors of the Tennessee Valley Authority which almost melted down and the reactor in southern New Jersey which failed twice in two days to shut down automatically when conditions deviated from normal."

Engineer: "A nuclear power station is the safest technology known to man. A person has yet to be killed by commercial nuclear energy.

At the time of the Browns Ferry incident, the plant was in fact not working and had not even been commissioned.

"The fire was not a nuclear fire but had been started during the testing of electrical cables in the required 'safe housing' regulation, foam rubber had been used to hold certain cables in a cavity and it was this that 'melted down'.

"An example of safety is the incident at Three Mile Island which was subjected to three mechanical and four human errors and yet the system operated as designed and superseded the errors and shut the

plant down without injury to a single person.

"People tend to let the horror of a nuclear bomb cloud their thoughts.

The connection of nuclear to bomb is the same as electric to chair or rope to hangman.

"There are seven safety factors built into a nuclear power station that stand between the nuclear fuel and the environment.

"It would take 30 days of total non-activity by people to allow the nuclear fuel to reach even the water table."

Dr Finkelstein "... Pollution problems caused by coal-fired power stations did not present insurmountable problems nor would the cost of a 'clean air' policy be prohibitive.

"The added cost of such a policy could largely be recouped by the sale of sulphuric acid..."

Engineer: "Apart from the known dangers

of acid rains, a coal-powered station produces, in their poisonous form, arsenic, cyanide and mercury.

"Figures produced in the United States show that for an X factor of electricity required for domestic use, the waste from coal of ash and sludge would fill 10 000 railroad cars while the waste from nuclear would amount to 0.5 of a cubic meter.

"From experience in America, the sale of sulphuric acid would account for around 10 percent of one percent of

a 'clean air' policy cost factor.

"With uranium being produced in South Africa we could become self-supporting in terms of energy, and with the use of breeder reactors like the Phoenix and Super Phoenix in France this situation could last forever.

"If there had been nuclear power in full operation in 1973, the world would not have had the inflation factor created by the oil situation of that period."

CSO: 5100/18

KOEBERG TO BEGIN OPERATION NEXT MONTH

Johannesburg THE CITIZEN in English 3 Feb 84 p 5

[Article by Bert van Hees]

[Text] CAPE TOWN. — SOUTH Africa's first nuclear power plant at Koeberg, about 40km outside Cape Town, is to be partly commissioned by the middle of next month, the minister of Mineral and Energy Affairs, Mr Danie Steyn announced in parliament yesterday.

This announcement comes in the wake of an announcement by the Government last week that South Africa now produced enough nuclear fuel for all its own needs.

Mr Steyn said it was planned that Koeberg, in terms of a revised programme, would commission the first 920 megawatt unit within six weeks.

He said a major part of the past year had been taken up by reparation, retesting and inspection of the plant after the sabotage incident in December 1982.

"As undertaken by my predecessor at that time, everything was done by Escom, the Atomic Energy Corporation of South Africa Ltd and the Council for Nuclear Safety to ensure the safety of the plant and the public."

Mr Steyn said construction and reparation work had been completed and functional tests of the nuclear steam supply system as well as that of the turbogenerator circuit had been finalised. The tests had been executed at the actual pressure and temperature the nuclear reactor and turbogenerator would be subjected to when in operation.

After these tests the AEC had issued a licence to proceed with the loading of the fuel. The process had been completed during the first week of November 1983 and on November 8 1983 the AEC granted permission to proceed with series of tests and inspections preceding commissioning. The turbogenerator was now ready to receive steam and to generate electricity.

Mr Steyn said operating personnel had been trained over a period of six years and licensed by the AEC. The emergency plan had been developed over a period of four years and demonstrated to the satisfaction of the AEC.

"The requirements regarding physical security as well as licensing requirements for nuclear power stations were drastically intensified since the start of the project in 1976.

In terms of the revised programme, it was planned that the first 920 MW unit would be ready towards the middle of March 1984 for commencement of commissioning. Synchronisation with the Escom power grid was planned for the middle of April 1984, while full power generation and takeover should take place by the middle of July 1984.

## BRIEFS

AEC ISSUE--Details of the R70-million Atomic Energy Commission (AEC) issue was announced by Senbank yesterday. Three tranches of the loan are reissues. They are a 19-year 13 percent loan priced to yield 15,10 percent, a 14-year 10,5 percent loan yielding 15,-20 percent and a five year loan to yield 15,85 percent. The final issue is a new one for three years. Issued at par, this will have a floating coupon rate 30 points lower than the prime lending rate. The loan opened yesterday and will close at noon tomorrow or earlier. The rates being offered are regarded as generous and the expectations are that the banks will not have much problem in attracting the money. AEC accidentally appeared as Escom in THE CITIZEN's review yesterday. We apologise to the parties involved. [Text] [Johannesburg THE CITIZEN in English 31 Jan 84 p 24]

NUCLEAR POWER FOR E. CAPE, NATAL--As soon as it becomes economically viable, nuclear-generated electricity will be introduced in the Eastern Cape and Natal, says Dr Wynand de Villiers, the executive chairman of the Atomic Energy Corporation (AEC). Dr de Villiers said the 1 844 Mw capacity of the Koeberg nuclear power station near Cape Town could be increased to 3 600 Mw by the addition of a few boilers. He said the high cost of transporting coal made nuclear power stations more viable than coal-fired stations at the coast. Coal in the Western Cape cost R45 a ton compared with R12 a ton in the Eastern Transvaal. "Nuclear power is much more acceptable in the environmental sense (than coal power) although it requires much higher capital investment. "A coal-fired station in the Cape with a capacity of 2 000 Mw would emit about 16 000 tons of ash and noxious fumes a day," he said. The recent severe drought in the Eastern Transvaal showed that inland stations were more vulnerable than coastal stations. [Text] [Johannesburg THE STAR in English 30 Jan 84 p 2m]

KOEBERG 'SAFE ENOUGH'--Further safety measures at Koeberg nuclear power station, near Cape Town, are unnecessary and will make the electricity it generates prohibitively expensive, says an Atomic Energy Corporation spokesman. Mr Dries Sonnekus said less radiation would be released from Koeberg than was contained in radioactive iodine in the body. The executive chairman of AEC, Dr Wynand de Villiers, said: "As far as I am concerned nuclear power stations are made as safe as they need be." [Text] [Johannesburg THE STAR in English 16 Jan 84 p 2M]

KOEBERG'S FINAL COST--THE final cost of Koeberg nuclear power plant would be about \$1 827-million, the Minister of Mineral and Energy Affairs, Mr Danie Steyn, said yesterday. Answering questions from Mr Roger Hulley (PFP, Constantia), Mr Steyn said the cost figure was calculated at 1983 prices and did not take into account either escalation costs before completion, or the cost of the sabotage damage, which was still being calculated. The minister added that all major construction work at Koeberg had been completed and that the less than 450 construction staff still at Koeberg were concerned mainly with commissioning the plant. [Text] [Johannesburg THE CITIZEN in English 9 Feb 84 p 4]

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GREECE

BRIEFS

MAJOR URANIUM DEPOSIT--The uranium deposits which have been located by IGME [Institute for Geological and Mineral Research] are estimated to amount to 400 tons. Deposits of 115 tons had been localized in the same area up until 1981. This emerges from the report on the institute's exploratory activity which was communicated by Minister of Energy and Natural Resources E. Kouloumbis. More specifically, it is emphasized that new lignite deposits, on the order of 870 million tons, and new uraneous phosphorite deposits, on the order of 200,000 tons, have been found at Delvinakion, Ipeiros. Explorations in various areas covering all of Greece have been programmed for 1984. [Text] [Athens TA NEA in Greek 10 Dec 83 p 16] 9247

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